Course Syllabus
MFG 180
Computer Aided Manufacturing
Spring 2017

Faculty: Stephen Jenkins
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Office Hours: By Appointment
Class Time Tuesday, 5:30 – 7:30 p.m. Lecture
7:45 – 9:45 Lab

Course Description: Computer Aided Manufacturing (3 credits)

This course provides students with experience in writing G and M Code programs, designing and posting programs using Mastercam, setting up and running those programs on CNC machine tools, and modifying and improving those programs thru editing.

Mastercam programming is used to produce machining instruction directly through Mastercam Software. You will learn to draw and design parts in Mastercam X6. You will also learn how to import and use files created on other software such as SolidWorks or Autocad. Finally, you will use Mastercam to set up the processing steps needed to machine your part on a cnc machine tool.

The G and M Code writing will develop your ability to easily read and understand a G and M code program. You will be able to write simple programs and edit existing programs with simple changes.

You will be taught to apply the knowledge on full scale CNC machines located at Parkside HS – CTE Manufacturing Lab. These machines include Haas Mill, Haas Lathe, Supermax Mill, and an AXYZ Router.

by Michael Mattson ISBN: 9781418060992

Lecture and Lab: Handouts
There will be handouts with each session to enhance and simplify the learning process.

To a lesser extent, Blackboard will be used as a supplementary site in this course. To use course content in Blackboard you need to have access to a computer with an Internet connection. Computers that meet these requirements are available for your use on campus.
COURSE OBJECTIVES, ASSESSMENT GOALS AND ASSESSMENT STRATEGIES

1. Discuss the use of MasterCAM and computer aided manufacturing relative to real and anticipated job opportunities locally and regionally.
   Assessment Strategy: Exam questions, quizzes and homework. *

2. Create, modify, rotate, and translate lines, points and geometry needed to define part contours and tool pathes in Mastercam.
   Assessment Strategy: Exam questions, quizzes and homework. *

3. Discuss the methods of Manual vs. CNC machining, as well as G&M Code programming and conversation Programming.
   Assessment Strategy: Exam questions, quizzes and homework. *

4. Produce a portfolio of MasterCAM files entered and backplotted in class.
   Assessment Strategy: Exam questions, quizzes and homework. *

5. Demonstrate the basics of setting up a job by using the Tool Manager Modules in Mastercam to designate tool numbers, descriptions, feed and speed parameters and offset data.
   Assessment Strategy: Toolbit grinding project review and grade. *

6. Demonstrate the ability to recognize and use generic G and M codes to write a functional program or modify an existing program.
   Assessment Strategy: Exam questions, quizzes and homework. *

7. Demonstrate the ability to set tooling in CNC machines.
   Assessment Strategy: Exam questions, quizzes and homework. *

8. Establish and explain Work Offset and Program Zero point in programs built in class which make use of work offsets and program zero point locating.
   Assessment Strategy: Exam questions, quizzes and homework. *

Outline:

1. Machining
   a. Tooling
   b. Milling coordinate systems
   c. Lathe coordinate systems
   d. Machine zero
   e. Reference return point
   f. Work zero point

2. G&M Code programming language.
   a. G codes – definitions and language usage.
   b. M codes – definitions and language usage.
   c. Programming language and methods of usage.
3. Geometry Creation in MasterCAM.
   a. Creation of entities.
      i. Lines
      ii. Arcs and Circles
      iii. Fillet and chamfer
      iv. Rectangles
   b. Modify and trim commands.
   c. Xform, rotate and trim commands
   d. Xform, rotation and translate commands.
   e. Contour definitions.
   f. Contour module.

4. Tool Paths
   a. Tool path creation and editing.
   b. Tool path verification.
   c. Part profiling.

5. Associativity
   a. Job setup
   b. Tool manager
   c. Tool definition and parameters.

6. Interfacing
   a. Fanuc controllers.
   b. Conversational control.

Major Topics
Coordinate system  Linear interpolation
Circular interpolation  Auxiliary coding
G coding  M coding
Drilling cycles  Sub-programs
Safety line  CNC setup
Program entry  Program editing
Graphic verification  Program check
Tooling
   a. Tool setup
   b. Tool selection
   c. Roughing
   d. Finish passes
   e. Multiple passes
   f. Tool offset programming
   g. Tool change
   h. Feeds and Speeds
GRADING CRITERIA

Grades will be determined on the basis of tests, weekly class/laboratory work, assignments, quizzes, Electronic Library project and final exam. This course will include a comprehensive final exam. The grading percentages are as follows:

QUizzes and Tests: 20%
Final Exam (April 25th): 10%
Assignments: 30%
Electronic Assignment: 10%
Programs, Mastercam Drawings, and Lab Setups: 30%

Conversion of numeric average to final grade:
90-100 = A
80-89 = B
70-79 = C
60-69 = D
0-59 = F

ATTENDANCE
Students are urged to attend all lecture and laboratory periods. If such a class is missed, however, it is the student’s responsibility to determine course material covered in that class and come to the class prepared to actively participate. Missed assignments due to absences will receive a zero if not made up. Missed assignments due on the date of the absence and turned in late will be penalized with a grade reduction of up to 25% per week.

Academic Honesty Policy:
Students are required to maintain a high level of academic performance. All work submitted to the instructor will be regarded as the work of the student taking the course. Cheating and plagiarism are defined in Wor-Wic’s Student Conduct Policy found in the College Catalog. Infractions of this policy will result in disciplinary action including failure of the assignment, test, or the course.

Acceptable Computer Use Policy
All students logging into Blackboard affirm that they understand and agree to follow Wor-Wic Community College policies regarding academic integrity and the use of College resources as described in the college catalog. Wor-Wic Community College considers the following as violations of the computer usage policy:

• Using the campus computing network and facilities to violate the privacy of other individuals
• Sharing of account passwords with friends, family members or any unauthorized individuals

Emergency Information Statement
In the event of severe inclement weather or other emergency, information about the closing of the college will be communicated via e2Campus and the College's website. Faculty will communicate with students about their courses and course requirements, such as assignments, quiz and exam dates, and class and grading policies, via Blackboard. Students will be responsible for completing all assignments in accordance with class policies.

Services for Students with Disabilities
Wor-Wic provides reasonable accommodations for students with disabilities, in compliance with the Americans with Disabilities Act of 1990 and Section 504 of the Rehabilitation Act of 1973. If you are in need of accommodations, please contact the counseling office at (410) 334-2899. For more information, see Wor-Wic's Services for Students with Disabilities web page.

Sexual Violence Disclosures
Wor-Wic Community College seeks a campus free of sexual violence which includes sexual harassment, domestic violence, dating violence, stalking, and/or any form of sex or gender discrimination. Please be aware that if a student discloses a personal experience verbally or in writing as a Wor-Wic student to a faculty or staff member, the employee cannot maintain confidentiality and has the mandatory responsibility to notify one of the college’s Title IX coordinators. However, if you’d like to make a confidential disclosure of any such violence, you can contact Wor-Wic’s director of counseling (X-2900) or you can contact the Life Crisis Center at 410-749-HELP or 2-1-1.